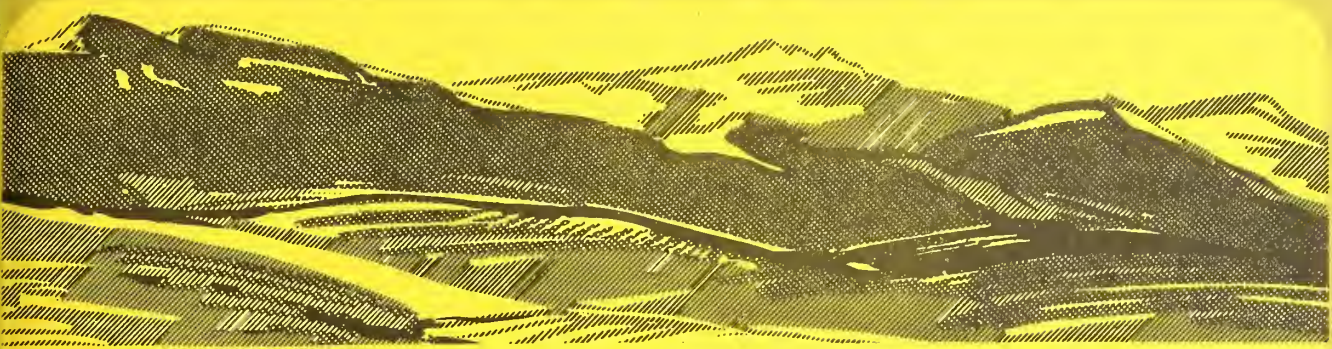


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RANGE IMPROVEMENT



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VOL. 11, NO. 2

NOTES

APRIL 1966

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FOREST SERVICE — U. S. DEPARTMENT OF AGRICULTURE
INTERMOUNTAIN REGION — OGDEN, UTAH

STATEMENT OF PURPOSE

- - -

This publication is printed primarily to inform professional range administrators of important range improvement and management developments and findings. These "Notes" may include extracts of published papers, unpublished preliminary reports of research work, unpublished reports on administrative studies and personal observations or suggestions of other range administrators. No claim is made as to the accuracy or completeness of studies or conclusions drawn.

All who read these RANGE IMPROVEMENT NOTES are encouraged to submit material for publication, or suggestions for improving its usefulness. Full credit will be given for any material used.

HOW TO STOP SEEPAGE FROM STOCK PONDS*

Disking sodium carbonate into the soil of western stock ponds that dry up before the end of the grazing season can reduce seepage to less than one-fourth inch per day--and provide cattle with sufficient water throughout the season.

Soil Scientist R. J. Reginato and Director L. E. Myers of the U. S. Water Conservation Laboratory, Tempe, Arizona, used sodium carbonate to change porous montmorillonite clay soil into nearly water-impermeable sodic soil.

Sodium carbonate seals the soil by ion exchange. Positive-charged sodium ions became attached to negative-charged sites on clay particles. The sodium causes the clay particles to swell when wet, break apart, and fill the pores in the soil.

Many western clay soils are relatively porous because positive-charged calcium ions are attached to the clay particles in the soil. But when a sodium salt--for example, sodium carbonate--is mixed in the soil, the calcium ions become detached and are replaced by sodium ions. The calcium ions combine with the carbonate ions to form calcium carbonate, an insoluble salt.

Reginato and Myers say that more study is needed on how long sodium-treated ponds will retain water. For example, a pond treated with sodium carbonate has proved successful for 2 years, but two stock ponds that were treated with another sodium salt, tetrasodium pyrophosphate (TSPP), began to leak after a little more than a year.

If calcium ions come into contact with sodium sealed soil--from runoff or sediment entering the pond--the calcium ions will exchange with the sodium ions and increase the permeability of the soil. The researchers believe, however, that adding small quantities of sodium carbonate to the pond water periodically will prevent the additional calcium ions from increasing the seepage rate.

A 1-acre pond can be sealed with sodium carbonate for about \$250. The cost of additional treatments would depend on the rate at which calcium ions reenter the soil.

*Published in RANGE AND WILDLIFE DIGEST, Northern Region, Missoula, Montana, April 1, 1966.

JUNIPER LITTER INHIBITS BLUE GRAMA*

The absence of blue grama under Utah juniper trees on northern Arizona ranges is due primarily to chemical inhibitors from the tree litter, not to competition for light and soil moisture. Solvent separations, paper chromatography, and colorimetric spot tests indicate that the principal active inhibitors are phenolic acids and their derivatives.

The inhibiting effect is more pronounced on heavy soils with poor aeration and drainage. Soil micro-organisms responsible for the breakdown of the toxic substances were fewer on the heavy soils--700 colonies per gram of soil as compared to 5,300 colonies in the lighter soils--and percolation was not as great.

It has been assumed that juniper trees compete strongly with grasses for soil moisture, and that removal of trees would therefore release space on and in the soil for increased grass production. In some cases this is undoubtedly true, especially with deep-rooted species. With shallow-rooted species such as blue grama, however, whose roots are concentrated in the upper 6-12 inches of soil, this assumption is invalid. Therefore, when trees are removed in control projects, significant production increases by such species should not be expected until the tree litter, at least partially, decomposes and accumulated toxins are broken down or leached from the soil.

*Rocky Mountain Forest and Range Experiment Station, 1965
Annual Report.

* * * * *

TACT fails the moment it is noticed.

--Edward Longstreth

FENCE DESIGNS FOR LIVESTOCK AND BIG GAME

BY

Charles Sundstrom
Wildlife Management Biologist

The Forest Service is interested in fence designs to be used in conjunction with any fence construction for livestock management on National Forest lands. This fence design must be a "multiple-use" fence whereby it provides for game crossing as well as regulation of sheep and cattle.

Designing a fence to regulate both sheep and cattle, and still allow free passage of all big game, presents several problems. Basically, the main problem resolves itself on how big game get by a fence.

1. Antelope

Antelope will tend to run up to a fence and go under the bottom wire or through the fence near the bottom portion. They will very seldom jump a fence that is even as low as three feet. A sheep-proof fence will, therefore, stop an antelope.

Fence types tested under a controlled situation by the Utah Cooperative Wildlife Research Unit which would offer the best possibilities for least interference with antelope movement and provide for sheep management are:

1. 32-inch net.
2. 26-inch net and one barb four inches above.
3. Standard cattleguards.

"A total fence height of 32 inches is apparently the maximum fence height that most antelope tested would readily cross." The study data indicate the adult antelope possess an inherent learning ability to cross fences, and through experience they might be expected to learn how to cross various fence types. Standard cattleguards will satisfactorily permit the movement of adult and yearling antelope, if they are placed so that they will be readily located by them. Study data indicate a corner location for cattleguards is more readily found and crossed by antelope.

The 32-inch and 26-inch net with one barbwire four inches above effectively held sheep, as did the standard cattleguard.

In a study by C. H. Rouse, 1954, the suggestion is, "Where fences cross regularly-established routes of travel, drop gaps or other suitable openings should be provided and left down when not required to hold livestock. "

The Interstate Antelope Conference in 1962, recommended a standard set of barbed wire fence specifications that would aid in the control of livestock and not seriously affect antelope movements (reference recommendations 1 and 2).

The 16-inch and 18-inch clearance between the lower wire and the ground level allows for antelope to go under the fence which they characteristically do. The maximum height of 40 inches will be of benefit to deer who most generally attempt to jump over fences.

North of Rock Springs, Wyoming, five fiberglass, 1,000-gallon water guzzlers were installed by the Wyoming Game and Fish Department for use by sage grouse. A 30-inch high fence enclosure was built around each guzzler to exclude livestock use. It was apparent from the first year's evaluation that heavy livestock use had taken place about the enclosure fence. There was no livestock use evident inside the enclosures even though there was water to entice them. The 30-inch fence did not hinder the antelope use as there were all sizes of tracks, including fawns, inside the enclosure. It is felt by the project biologist "that antelope use could be increased by installing an antelope-crossing cattleguard in the enclosure fence. These should be of light-weight material and not as long as conventional ones, because there is no vehicle travel involved, and one must be able to life them up to clean them out periodically. "

A diagrammatic example of this antelope crossing cattleguard is shown in recommendation No. 4.

2. Deer, Elk, and Moose

Deer most generally jump over a fence, however, they are frequently observed going under or through a fence. Adult deer, in good condition, usually have no trouble with sheep-type fences. Young fawns, and those deer in poor condition, may be stopped by a sheep-type fence. In late winter or early spring after a hard winter when deer are usually in poor condition, any fence may be harmful.

Elk and moose usually go through or jump over the top of a fence. Calves may, however, have difficulty in negotiating some fences.

The Western States Fish and Game Departments have had very good success with fences constructed not to exceed 40 inches in height. This can be either a three- or four-strand barbed wire fence with posts approximately sixteen feet apart. It is found that a fence of this type will turn cattle and horses very effectively and still be low enough for deer to cross easily, seldom damaging the fence.

In areas where elk and moose cross, the same type of fence is effective, but still better if a pole is used in place of the top wire of the fence with some type of a stay or brace between posts to keep the pole from sagging. Elk and moose have a tendency to drag their hind feet over a fence, and a pole used for the top strand is easily seen, or if they drag their rear feet, no damage is done. In either case, it has proved effective.

3. Bear

Bear will go under or through a fence or are quite capable of climbing over the top. Fences do not seem to be a problem with bear.

SUMMARY OF RECOMMENDATIONS

1. Antelope

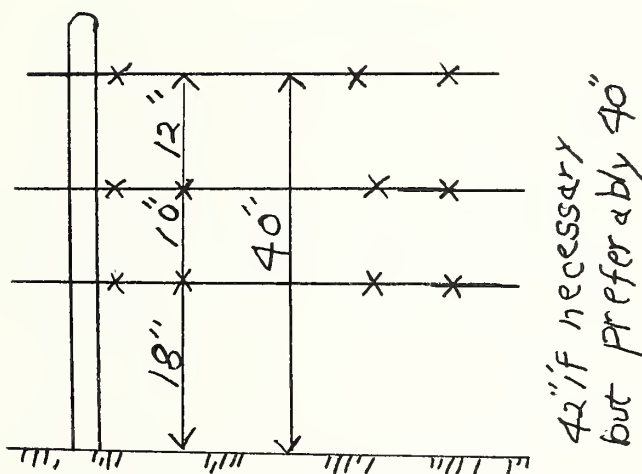
- a. Fence not over 32 inches high.
- b. Fence at least 16 inches, preferably 18 inches clearance between the lower wire and the ground level.

2. Deer, Elk, and Moose

- a. Fence not to exceed 40 inches high.
- b. Where possible, poles should be used in place of the top wire, as it appears to be most effective insofar as game damage to range fences is concerned.

Recommendation No. 1

Barbed Wire Fences (For benefit of livestock and wildlife)

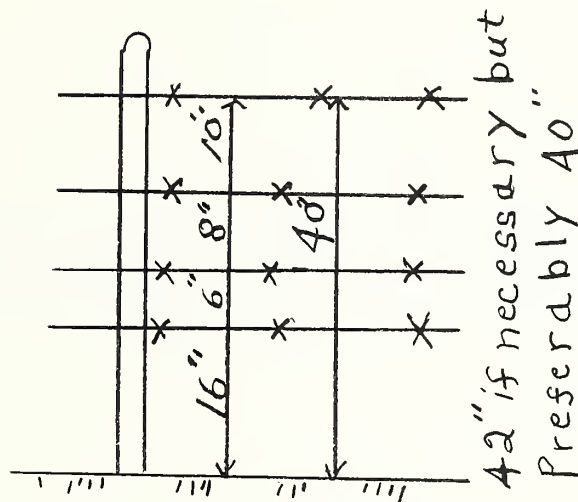


This 40-inch fence, if necessary for livestock purposes, could be raised to a 42-inch height. But before raising up to 42 inches, consider the possibility of Recommendation No. 2, a four-strand fence. This fence will regulate cattle and horses, but because it is 18 inches from ground level to bottom strand, it will allow antelope to pass through easily. Since it is only 40 inches high, deer, elk, moose, and their young can negotiate it easily. The 40-inch height will allow (in most cases) deer in poor condition after a hard winter to cross easily.

If possible, a pole should be used in place of the top barbwire strand. This is because elk and moose have a tendency to drag their hind feet over a fence, and a pole used for the top strand is either easily seen or if they drag their feet, no damage is done. In either case, it has proved effective.

Recommendation No. 2

Barbed Wire Fences (For benefit of livestock and wildlife)

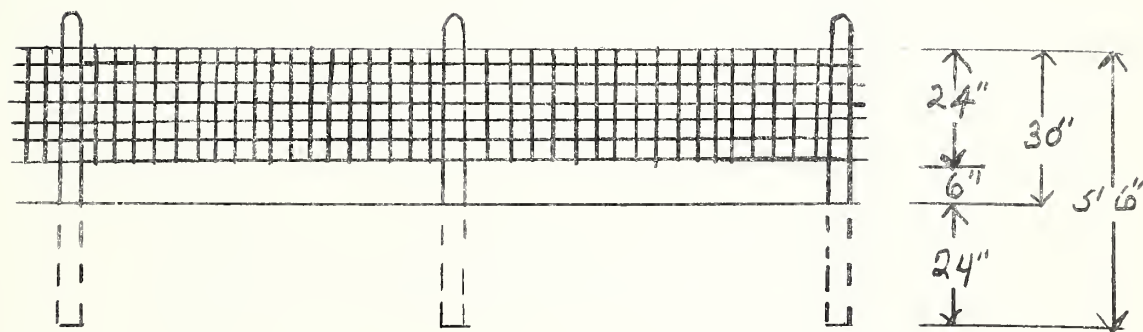


This 40-inch fence, if necessary for livestock purposes, could be raised to a 42-inch height. It will regulate cattle and horses, but because it is 16 inches from ground level to bottom strand, it will allow antelope to pass through easily. Since it is only 40 inches high, deer, elk, moose, and their young can negotiate it easily. The 40-inch height will allow (in most cases) deer in poor condition after a hard winter to cross easily.

If possible, a pole should be used in place of the top barbwire strand. This is because elk and moose have a tendency to drag their hind feet over a fence, and a pole used for the top strand is either easily seen or if they drag their feet, no damage is done. In either case, it has proved effective.

Recommendation No. 3

Net Wire Fences (For benefit of livestock and wildlife)



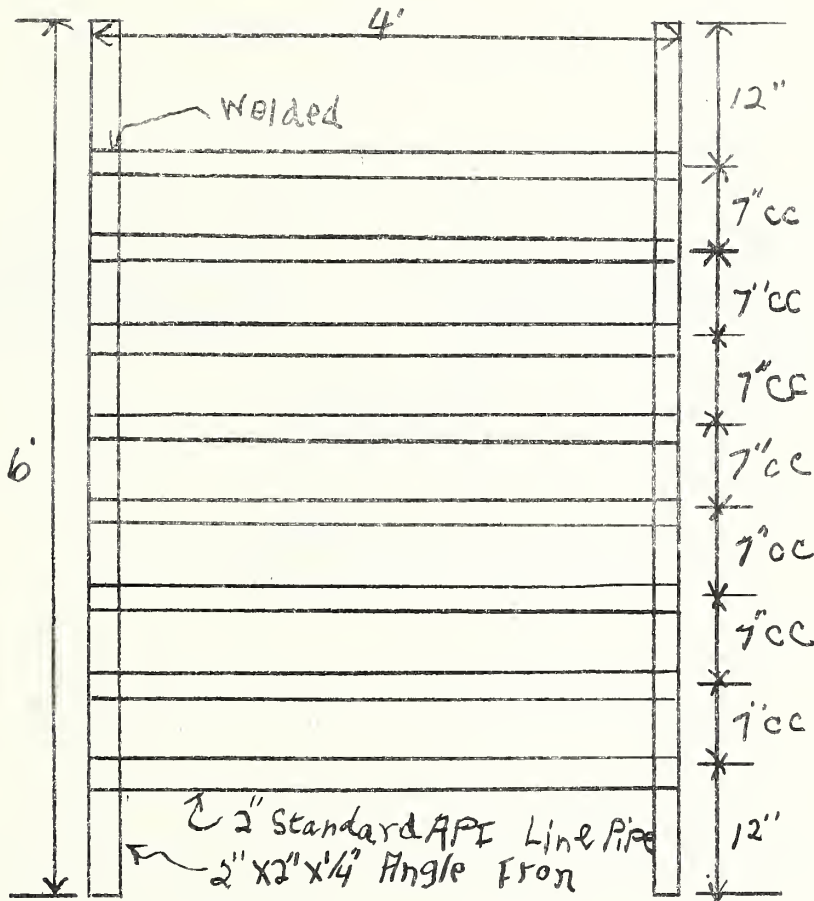
This sheep-type net wire fence is designed to be used on sheep ranges where antelope also inhabit.

Antelope usually go under a fence if there is 16 inches or more between the ground and the bottom strand. However, the 16 inches or more between ground and bottom strand will also allow sheep to pass through the fence. Research has proven that antelope will jump a net wire fence if it is no more than 30 inches to 32 inches high.

This fence being only six inches from the ground will stop sheep but since it is only 30 inches high, antelope can jump it easily. The 30-inch height of the fence also allows deer, elk, moose and their young to jump the fence very easily.

Recommendation No. 4

Cattleguard
(For benefit of wildlife)



In the case where fences are more than 40 inches to 42 inches high and less than 16 inches from the ground to the bottom strand of the fence, this "antelope crossing cattleguard" is suggested.

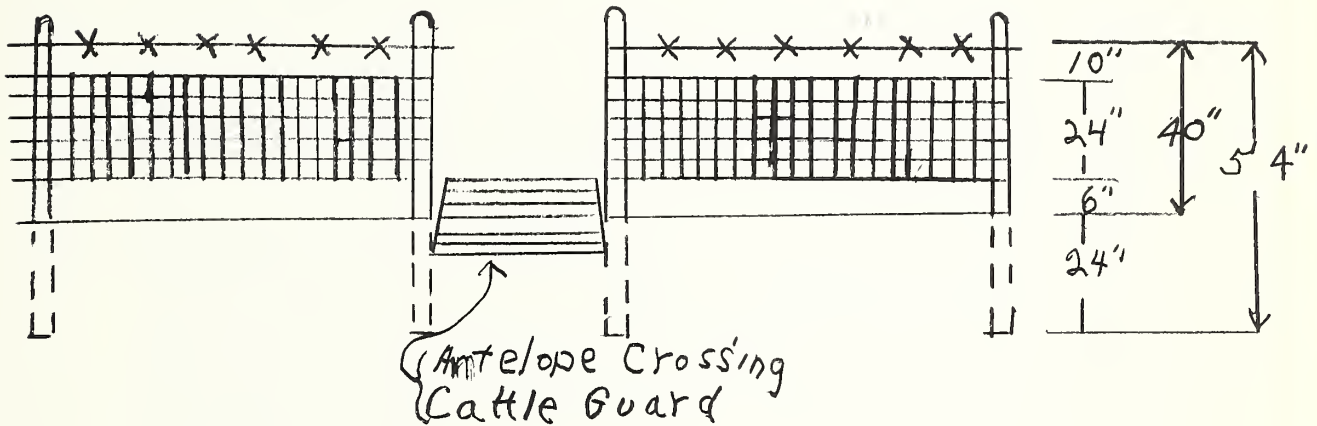
Antelope have been observed many times jumping across cattleguards. This type of "antelope crossing cattleguard" should be of light-weight material and not as long as conventional ones, because there is no vehicle travel involved, and one must be able to life them up to clean them out.

Since it is a cattleguard device, it will regulate all classes of livestock. Since it is only six feet long, all classes of big game will cross it readily, especially antelope.

This device is especially useful in the corners of fences where big game quite frequently congregate.

Recommendation No. 5

Barbed Wire and Net Wire Fences
(for benefit of livestock and wildlife)



In areas where it is necessary to regulate domestic sheep, cattle, and horses and also consider movements of antelope, deer, elk, and moose, this type of fence is suggested.

The 30-inch net wire fence will regulate sheep. The 40-inch high barbwire will regulate cattle and horses. Being only 40 inches high, deer, elk, moose, and their young can cross easily. The "antelope crossing cattleguard" will allow antelope to cross easily. The cattleguard will allow deer in poor condition after a hard winter to cross easily.

If possible, a pole should be used in place of the top barbwire because elk and moose have a tendency to drag their hind feet over a fence. The pole used for the top strand is either easily seen or if they drag their feet, no damage is done. In either case, it has proved effective. This type of fence also holds up under relatively heavy snow conditions.

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EXPECT
the
UNEXPECTED
on
hills and curves.

* * *

Everything gets easier with practice

EXCEPT
getting up in the morning

--Dave Eastman
Los Angeles Times Syndicate

TORDON TOXICITY*

Because of recent questions concerning the toxicity of Picloram (Tordon) and its apparent success in noxious weed control, you will be interested in Mr. Eugene Heikes' comments. Mr. Heikes is Extension Weed Specialist with the Colorado Cooperative Extension Service at Fort Collins, Colorado.

In the spring 1965 issue of **DOWN TO EARTH**, there is the following statement, "Fish were exposed for 96 hours to various concentrations of Tordon in Lake Huron water, held at a temperature of 50° F. The test was conducted under conditions described as standard for the examination of water and wastewater." Medium tolerance levels ranged from 135 ppm to 420 ppm in water. The safe maximum limit ranged from 59 to 320 ppm. Fish species tested included Fathead minnow, Brook trout, Brown trout, Rainbow trout, Green sunfish and Black bullhead.

These maximum safe limits (59 to 320 ppm) are much higher than would be possible to obtain in water by simply spraying over the surface (2.7 lbs. of chemical per acre-foot of water equals 1 part per million), so I would consider Tordon almost as nontoxic to fish or animals as any agricultural chemical on the market. The LD-50 of Tordon is about 8,000 milligrams per kilogram - comparing this with 2,4-D which ranges between 400 and 700 milligrams per kilogram, depending on formulation. In other words, Tordon is less than 1/10 as toxic as 2,4-D to warmblooded animals.

*Published in **RANGE AND WILDLIFE ABSTRACTS**, Rocky Mountain Region, Denver, Colorado, March 17, 1966.

* * *

Road courtesy can save lives - even YOURS.

FERTILIZING RANGE LANDS*

Nitrogen fertilizer applied on seeded foothill stands of wheatgrass increased yield of herbage, the number of seed heads per plant, the basal area of the grass crown, palatability of herbage, and the number of roots. Nitrogen fertilizer increased protein content about one-third in forage during early stages of growth but had no noticeable effect on forage after it reached anthesis. Height of plant, and leaf length, in most cases, were not affected by application of nitrogen fertilizers.

Applications of 30 to 40 pounds of nitrogen per acre could be expected to produce an average of 800 to 1000 pounds of additional herbage per acre on seeded foothill ranges. About 60 percent of this increase would be received the first year, about 30 percent the second year as carryover, and the remaining 10 percent the third year.

Phosphorus fertilizer applied to foothill ranges had no significant effect on yield of grass herbage, palatability, nutrient content or general vigor of plants. However, on native mountain range, phosphorus appeared to improve yield of herbage but was considerably less beneficial in this respect than nitrogen. Phosphorus and nitrogen together appeared to have additive effects on yield of herbage on native mountain meadows.

Neither nitrogen nor phosphorus at either 20 or 40 pounds per acre had any beneficial effect upon seedling emergence, survival of plants, or subsequent production when applied at the time of seeding. This was true for seedings on both arid and mountain ranges either with or without annual weed competition.

Nitrogen fertilizer appeared to offer promise in renovating deteriorated stands of crested wheatgrass if administered along with two to three years of rest.

Nitrogen fertilizers on mountain meadows increased yield of herbage, protein content, and palatability.

Total nitrogen recovery ranged from 19 to 43 percent on seeded foothill range where average annual precipitation is about 12 inches and as much as 80 percent on seeded mountain range.

*Dr. C. Wayne Cook, Research Professor, USU, Logan, Utah.
Utah Agr. Expt. Sta. Bul. 455. 1965

It has been found that herbage on most range soils will respond to nitrogen fertilization, but before extensive areas are treated on a practical scale, tests should be made on small plots to see if the benefits received will justify the cost.

Benefits received may include increased forage yield, protein percentage, plant vigor, and palatability.

* * * * *

Most people would succeed in small things if they
were not troubled by great ambitions.

--Longfellow

* * * * *

Happiness has a habit of pursuing the person
who
feels grateful to his God,
comfortable with his conscience,
in favor with his friends,
in love with his labors,
and
in balance with his banker.

--Science of Mind

* * * * *

Man is born broken - He lives by mending
The grace of God is
glue
--Eugene O'Neill



